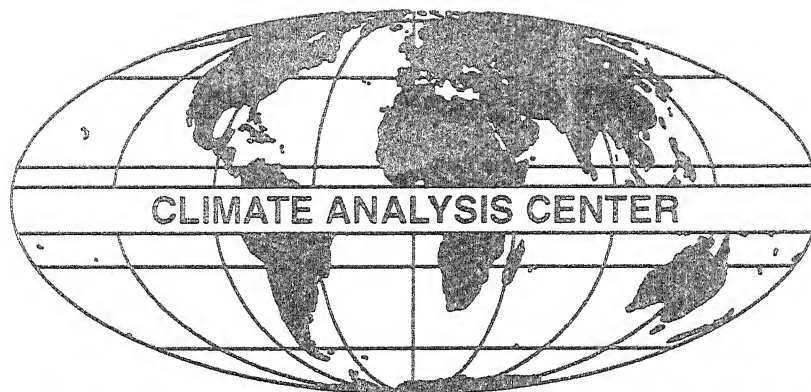


CONTAINS:
UPDATE ON
CLIMATE
CONDITIONS
IN THE
MIDWEST
AND
SOUTHEAST

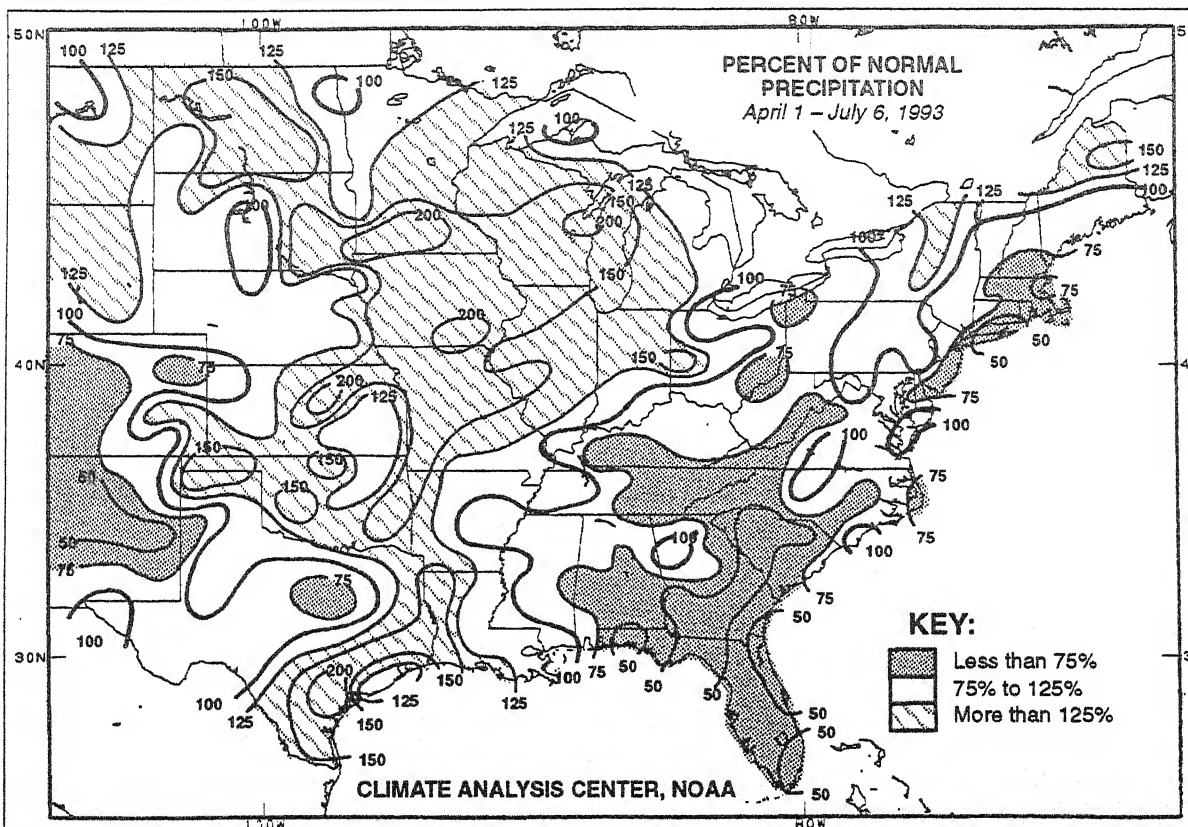


WEEKLY CLIMATE BULLETIN

No. 93/27

Washington, DC

July 7, 1993



INCESSANT RAINS GENERATE RECORD FLOODING ACROSS PARTS OF THE LOWER AND MIDDLE MISSISSIPPI VALLEY WHILE MOISTURE DEFICITS INCREASE THROUGH MUCH OF THE SOUTH AND EAST. More than two feet of rain fell on parts of the Mississippi Valley since the beginning of the growing season (April 1), with totals exceeding 16 inches at some locations since June 6. Most locations along the Mississippi River from northern Iowa

southward to south-central Missouri have or will likely observe record high crests. Barge traffic remains halted from St. Paul, MN to St. Louis, MO, creating losses of approximately \$1 million per day, according to industry analysts. Press reports additionally indicate at least 16 lives lost and over \$1 billion in agricultural losses as a result of the severe, widespread flooding. In sharp contrast, abnormally little rain fell on much of the South and East during the same period, with accumulated moisture deficits of six to 13 inches common. The dryness, recently aggravated by intensely hot and humid conditions, has caused agricultural stress but has yet to create significant hydrological concerns. For more details, refer to the Special Climate Update on pages five and six.



UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE-NATIONAL METEOROLOGICAL CENTER
CLIMATE ANALYSIS CENTER



WEEKLY CLIMATE BULLETIN

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- *Highlights of major climatic events and anomalies.*
- *U.S. climatic conditions for the previous week.*
- *U.S. apparent temperatures (summer) or wind chill (winter).*
- *Global two-week temperature anomalies.*
- *Global four-week precipitation anomalies.*
- *Global monthly temperature and precipitation anomalies.*
- *Global three-month precipitation anomalies (once a month).*
- *Global twelve-month precipitation anomalies (every three months).*
- *Global three-month temperature anomalies for winter and summer seasons.*
- *Special climate summaries, explanations, etc. (as appropriate).*

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Climate Analysis Center via the Global Telecommunications System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JULY 3, 1993

1. North-Central United States:

HEAVY RAINS CONTINUE.

Based on River Forecast Center data, up to 120 mm of rain drenched the region as six-week precipitation excesses reached 220 mm in parts of Iowa and Illinois. The persistently wet weather has engendered saturated soils, very high streamflows, and frequent episodes of flooding (see pages 5 and 6) [20 weeks].

2. Southeastern United States:

SHOWERS BRING LIMITED RELIEF.

Moderate rains (up to 90 mm) brought limited relief to Alabama and Georgia, but lesser amounts fell on the Carolinas. Six-week moisture deficits ranged from 70 to 150 mm, with the driest conditions reported in northwestern South Carolina and south-central North Carolina (see page 6) [10 weeks].

3. Central Mexico:

ABUNDANT RAINS AGAIN REPORTED.

Although the demise of Tropical Storm Arlene brought improved conditions to Louisiana, Texas, and northern Mexico, more heavy rains (up to 400 mm) were reported across central Mexico [2 weeks].

4. British Isles:

WET SPELL ENDS.

Great Britain and Ireland received little or no precipitation as drier weather brought relief to the saturated area [Ended at 8 weeks].

5. Scandinavia:

TEMPERATURES MODERATE.

Near normal temperatures prevailed across most of the region as the cold snap ended [Ended at 4 weeks].

6. Southeastern Europe:

MORE DRY WEATHER.

Light rains (10 to 40 mm) fell, allowing six-week moisture deficits to reach 80 mm in parts of Hungary, former Yugoslavia, and Romania [12 weeks].

7. Southwestern Asia:

UNUSUALLY WET WEATHER PERSISTS.

Up to 90 mm of rain drenched the area as abnormally wet conditions continued. During the past six weeks, more than three times the normal amount of precipitation fell on some locations, with six-week moisture surpluses ranging from 50 to 170 mm [9 weeks].

8. Korea, Japan, and Northeastern China:

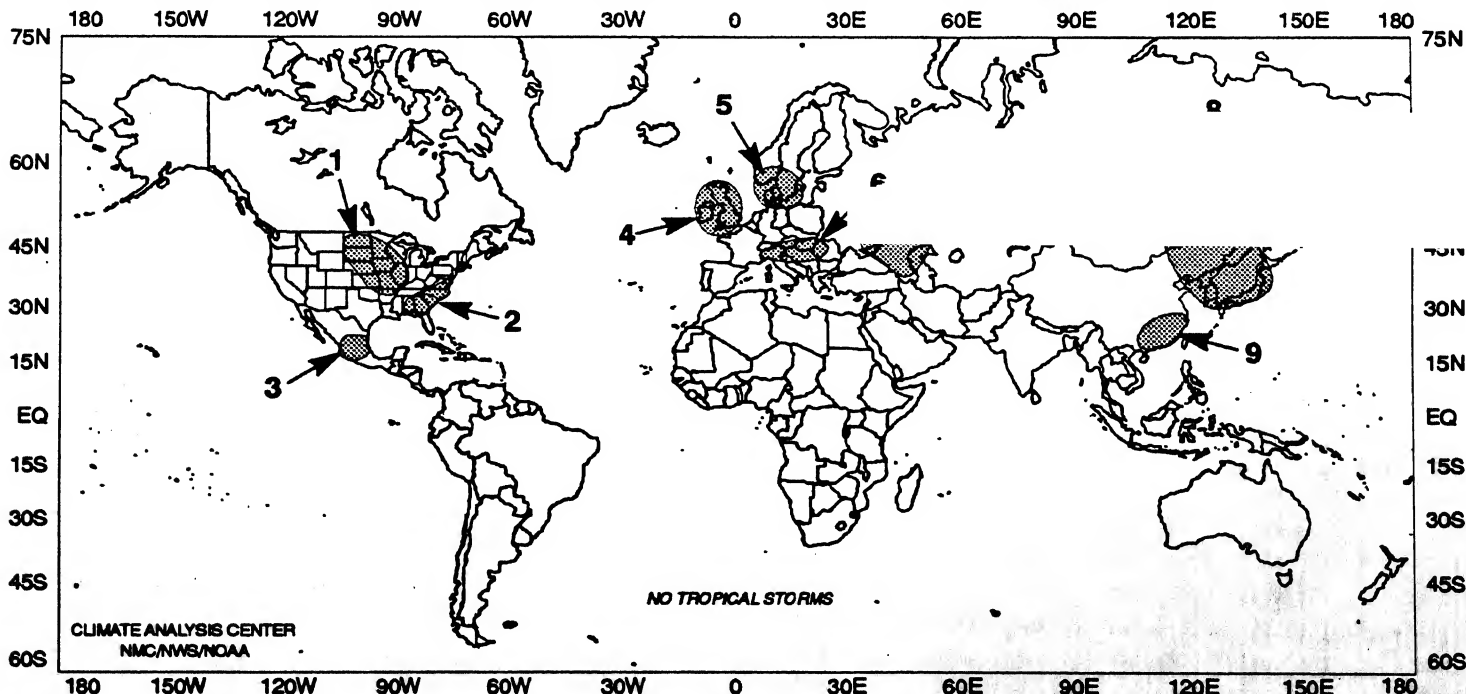
MORE HEAVY RAINS.

Heavy showers again inundated Japan, Korea, and northeastern China with as much as 340 mm, 225 mm, and 125 mm, respectively. Six-week rainfall excesses approached 550 mm in southwestern Japan and 200 mm in Korea [12 weeks].

9. Southeastern China:

TORRENTIAL DOWNPOURS REPORTED.

Over 300 mm of rain soaked some locations as six-week moisture surpluses remained as high as 250 mm [12 weeks].



EXPLANATION

TEXT: Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.

MAP: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long-term anomalies, and other details.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF JUNE 27 – JULY 3, 1993

Showers and thunderstorms again drenched much of the nation's midsection from the northern and central Plains to the central Appalachians with moderate to heavy rains. Unusual severe summer flooding, resulting from the persistent and heavy rains of the last month, forced the closure of the Mississippi River to barge traffic from St. Paul, MN to St. Louis, MO and to recreational traffic from Davenport, IA to Grafton, IL. Barge operators estimated losses at \$1 million a day. The river hit all-time record high stages at Keithsburg, IL and Burlington, IA, threatening to close the only two remaining open bridges (a U.S. highway bridge at Quincy, IL, and the U.S. 136 bridge at Keokuk, IA) between a 230 mile stretch from Fort Madison, IA to Hannibal, IL. In Winfield, MO, about 55 miles north of St. Louis, the river broke through a levee, inundating thousands of acres of farmland and forcing the evacuation of more than 1,000 families, according to press reports. The Missouri River was also closed by the Coast Guard from Jefferson City, MO to St. Louis because of flooding. Elsewhere, nearly 2,000 people in Madison, SD were evacuated from their homes as torrential rains swelled creeks to two feet above flood stage. The heavy rain forced the St. Marys River out of its banks near Port Recovery, OH, severely damaging some homes, according to press reports.

While many cities along the swollen rivers suffered substantial damage (particularly at Davenport, IA, which is not protected by levees), millions of acres of farmland were flooded as well. Wisconsin Governor Thompson estimated damage in 30 counties across the southwestern portion of the state at \$175 million, including \$124 million to farm fields and crops. In Iowa, officials projected crop losses at \$750 million while Minnesota officials said 80 percent of the corn and 85 percent of the soybean crop are in poor to very poor condition because of the flooding. Governors of Wisconsin, Minnesota, South Dakota, Iowa, and Illinois are requesting federal disaster assistance for farmers in their state. In contrast, dry and hot weather has been adversely affecting crops in the southern Atlantic Coast States, where several drought conditions in the Carolinas and Florida endured their driest on record.

At the beginning of the week, another in a series of weather fronts, gradually trekked southeastward across the central Plains, middle Mississippi Valley, and Great Lakes, bringing showers and thunderstorms. Showers and thunderstorms were also widely scattered in the hot and muggy air ahead of the system over the lower Mississippi Valley, Southeast, mid-Atlantic, and Northeast. Severe thunderstorms, accompanied by large hail, high wind, tornadoes, and heavy rain, were widespread from the central Plains to the upper Ohio Valley and over Florida. On Tuesday, the northern portion of the front sped toward the Atlantic Ocean as the southern portion became stationary, reaching from the middle Missouri Valley to the mid-Atlantic coast. Farther west, a disturbance moved out

of the Rockies and into the northern and central Plains. Heavy rain from intense thunderstorms again caused flash flooding in the middle and lower Missouri Valley and upper Mississippi Valley.

During the latter part of the week, showers and strong thunderstorms continued to develop from the central Plains eastward. Torrential rain pelted portions of northeastern Kansas, northern Missouri, eastern Illinois, central Indiana, and western Ohio, forcing numerous streams and rivers out of their banks and aggravating flooding. Severe thunderstorms, with locally heavy rain, were also scattered over the southern High Plains, lower Mississippi Valley, Southeast, and Appalachians. At week's end, a powerful storm system moved through the northern Rockies and into the northern and central Plains, dropping more than a foot of snow on the mountains and generating more rain in the water-logged upper Midwest. Up to five inches fell in two hours across eastern South Dakota and southern Minnesota.

According to the River Forecast Centers, the greatest weekly totals (between two and ten inches) were recorded across the northern and east-central Plains, the upper and middle Mississippi and Ohio Valleys, and the central Appalachians. Scattered totals of two or more inches also fell across the Southeast, the lower Mississippi Valley, the Great Lakes, the southern High Plains, the northern Rockies, and the Big Island of Hawaii. Light to moderate amounts were observed in the Northwest, the central Rockies, southern Alaska, and the remainders of the northern Rockies, southern High Plains, lower Mississippi Valley, and eastern third of the nation. Little or no precipitation fell in California, the Southwest, the Great Basin, the central High Plains, the southeastern Plains, northern and central Alaska, and the remainder of Hawaii.

Warmer than normal conditions covered most of the southern two-thirds of the nation and portions of the Northeast, with departures of +3°F to +6°F across much of the central and southern Rockies, central High Plains, Ozark Plateau, lower Ohio and Tennessee Valleys, and Carolinas. Heat and humidity combined to produce apparent temperatures above the century mark over much of the Southeast, lower Mississippi Valley, and Desert Southeast. Abnormally warm weather also covered most of the state of Alaska, with weekly departures up to +10°F at Kotzebue. Temperatures also averaged above normal across western and central Hawaii.

Abnormally cool weather spread over much of the northern third of the lower 48 states, with weekly temperatures averaging at least 6°F below normal in the interior Northwest and over the north-central States. Temperatures dipped into the thirties in portions of the northern Rockies, northern Plains, and upper Great Lakes. In Alaska, below normal temperatures were limited to scattered southern locations while relatively cool air also prevailed in eastern Hawaii.

OBSERVED PRECIPITATION (INCHES)

CLIMATE ANALYSIS CENTER, NOAA
Computer generated isobaths
Based on preliminary data.

PRECIPITATION PERIOD
12 GMT Sun. - 12 GMT Sun.

Legend:

- >4
- 2 to 4
- 1 to 2
- >.5 to 1
- .01 to .5
- <.01

CLIMATE ANALYSIS CENTER, NOAA
Computer generated isohyets
Based on preliminary data

PRECIPITATION PERIOD
12 GMT Sun. - 12 GMT Sun.

Legend:

- >4
- 2 to 4
- 1 to 2
- >.5 to 1
- .01 to .5
- <.01

CLIMATE ANALYSIS CENTER, NOAA
Computer generated isohyets.
Based on preliminary data.



$\frac{f}{\cdot}$

CLIMATE ANALYSIS CENTER, NOAA
Computer generated isohyrm
Based on preliminary data

4f

Box with four dots: >90

CLIMATE ANALYSIS CENTER, NOAA
Computer generated isotherms
Based on preliminary data

[illegible]

0. F.

CLIMATE ANALYSIS CENTER, NOAA
Computer generated contours
Based on preliminary data

MATCHED AREAS: 100°F

80-89
90-99
100-109
110-119
>120 Extreme Danger

70 75 80 85 90 95 100 105 110 115 120

ALASKA
HAWAII

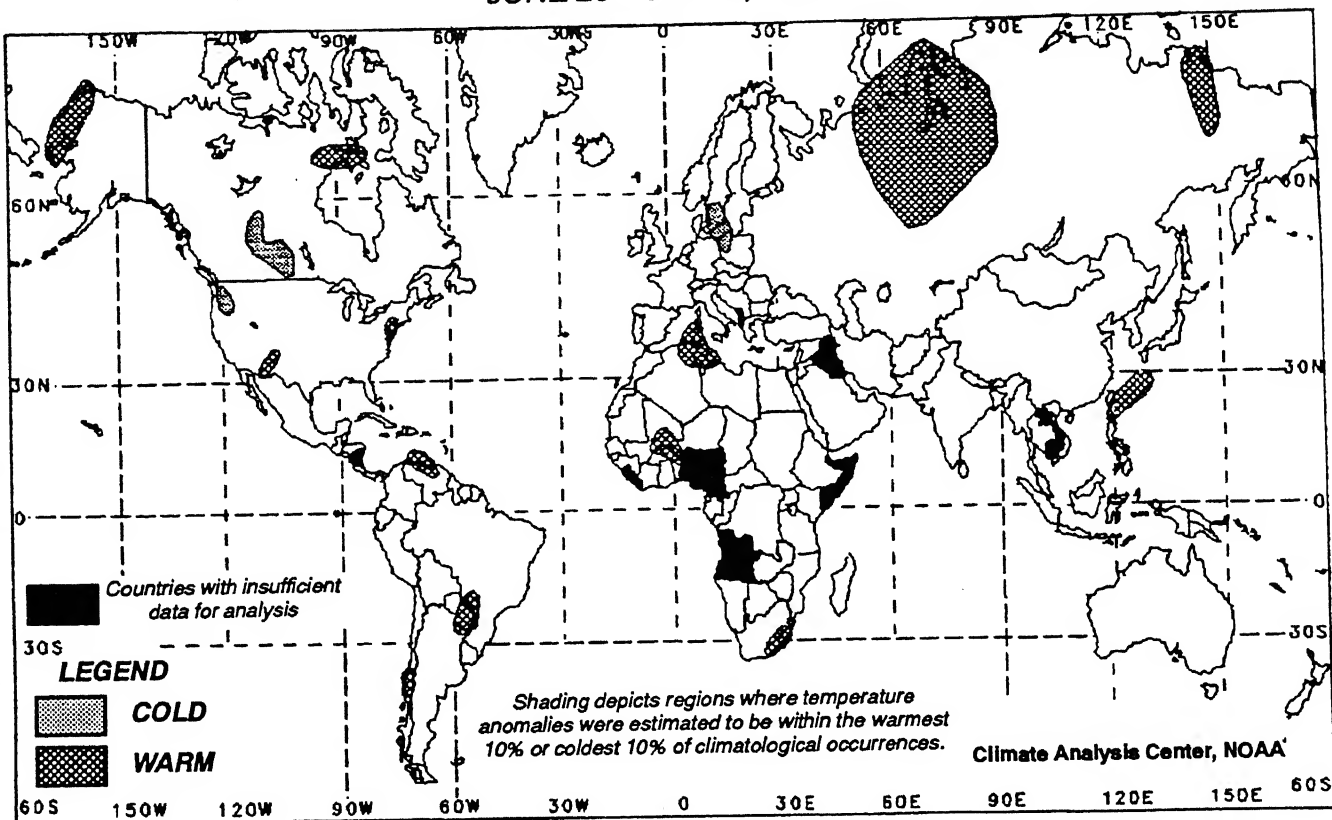
CLIMATE ANALYSIS CENTER, NOAA
Computer generated contours
Based on preliminary data

SOUTHERN RAIL STREET 105 FT
80-90 Carillon
90-109 Extreme Caution
100-130 Bridge
>130 Extreme Danger

ATCHED AREAS>100%

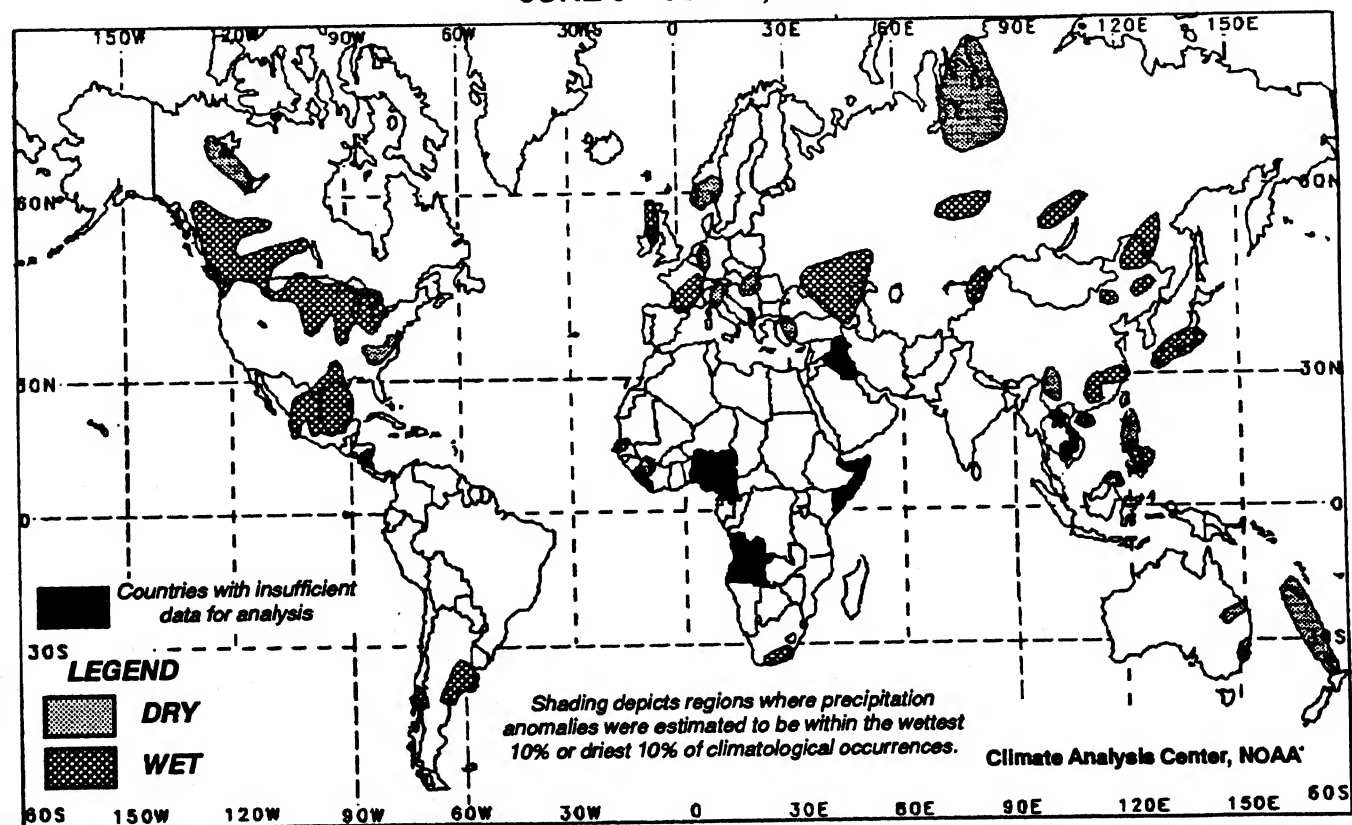
TWO-WEEK GLOBAL TEMPERATURE ANOMALIES

JUNE 20 – JULY 3, 1993



FOUR-WEEK GLOBAL PRECIPITATION ANOMALIES

JUNE 6 – JULY 3, 1993



SPECIAL CLIMATE UPDATE

*Analysis and Information Branch
Climate Analysis Center, NMC
National Weather Service, NOAA*

SEVERE FLOODING PLAQUES THE UPPER AND MIDDLE MISSISSIPPI VALLEY

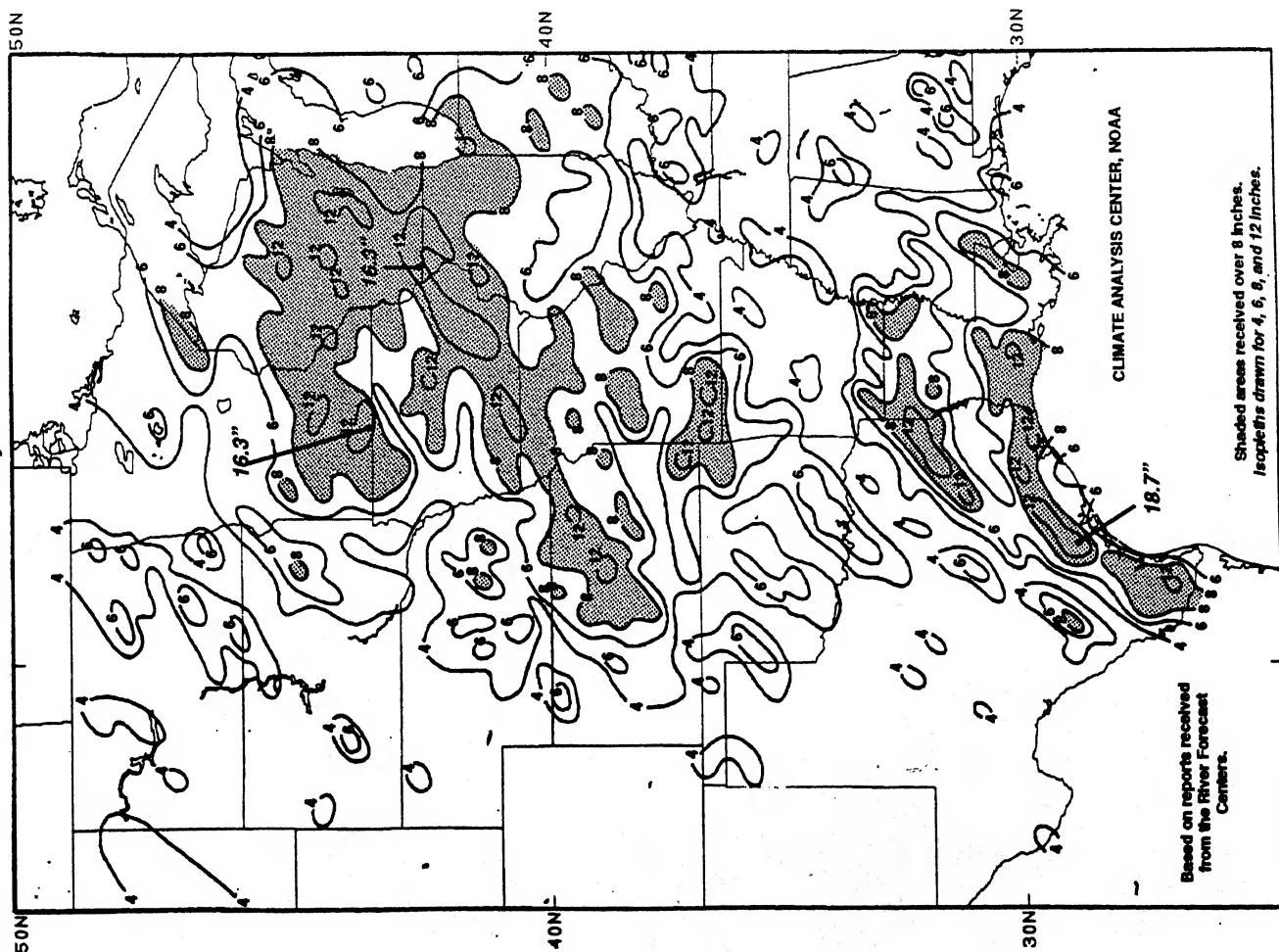
INCIPIENT DRYNESS, HEAT, AND HUMIDITY STRESS CROPS AND PEOPLE IN THE SOUTH AND EAST

Above normal precipitation has been observed through most of the upper Midwest, eastern Great Plains, and Mississippi Valley since at least the beginning of the growing season (April 1), and dates back nearly eight months at some locations. The combination of long-term moisture surpluses heading into the growing season, persistently above normal precipitation since April 1 (see front cover), and deluging rainfall during the last month (see figure at left) has created severe flooding throughout the northern half of the Mississippi Valley, as well as along parts of the Black, Minnesota, Iowa, Des Moines, and Missouri Rivers. Many reservoirs are filled beyond capacity (overflowing), numerous levees have given way, and severe lowland flooding has resulted along the Mississippi and lower Missouri Rivers, with the Mississippi expanding to a width of nearly seven miles at some points. Most locations along the Mississippi from northern Illinois/Iowa southward to south-central Missouri have observed or almost certainly will observe their highest levels on record, with areas farther north enduring the highest crests since the snowmelt-induced spring floods of 1965. According to the U.S. Army Corps of Engineers, many of the aforementioned locations are experiencing river levels with a statistical likelihood of once per one-hundred years while some locations in northeastern Missouri and west-central Illinois are experiencing river levels with a five-hundred-year return period. The Mississippi River from St. Paul, MN southward to St. Louis, MO and the Missouri River from Jefferson City, MO eastward to the Mississippi have been closed to barge traffic since late June and early July, respectively. According to industry analysts, this has resulted in a loss of approximately \$1 million per day. Fortunately, severe flooding is not considered likely farther downstream on the Mississippi (from Kentucky southward) since the forthcoming crest will be partially alleviated by a below normal contribution from the incoming flow of the Ohio River. Tropical Storm Arlene dropped inundating rainfall (daily totals unofficially topping 14 inches) on portions of the southeastern Plains and lower Mississippi Valley in late June, but the event was relatively short-lived, resulting in no major river flooding and only scattered field flooding. Press reports indicate agricultural losses resulting from unplanted crops at roughly \$1 billion, not counting losses to crops which may have been damaged after planting.

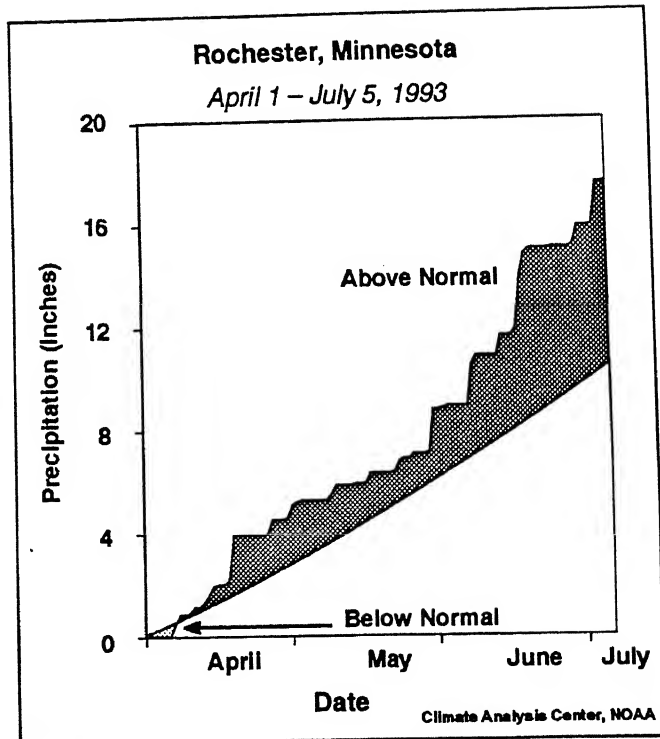
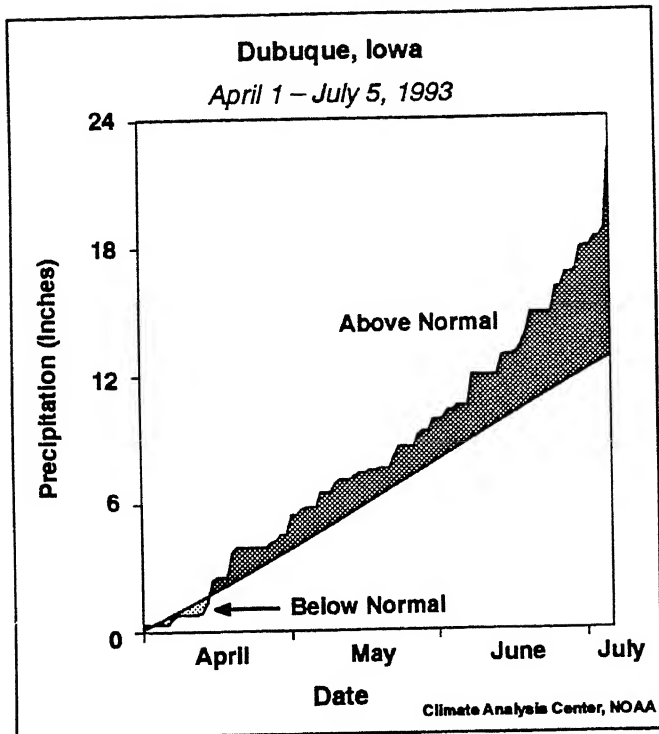
While moisture has come in abundance to the aforementioned regions, rainfall has been sorely lacking farther south and east. Portions of the northern and southern Atlantic Coast and much of the Southeast received only 35%–75% of normal rainfall since the beginning of the growing season, resulting in stressed crops. Accumulated moisture deficits during the period reached over a foot in portions of eastern Florida. Despite the recent dryness and resultant lack of crop-available moisture, long-term hydrological problems have yet to develop, primarily because the dry spell followed a long period of generally at or above normal precipitation. The dry spell, however, has been exacerbated by hot weather which has plagued parts of the Southeast since early June and the entire length of the East Coast since early July. Beginning June 1, southeastern locations have generally averaged 29° to 40° above normal with highs topping the century mark on as many as eight days at some locations by July 6. Apparent temperatures (heat indices) exceeding 100°F were observed as far north as southern New England.

TOTAL PRECIPITATION (IN)

June 6 – July 5, 1993



DAILY CUMULATIVE PRECIPITATION



Abnormally wet weather prevailed in the north-central states since April 1. Dubuque, IA (top left) and Rochester, MN (top right) received more than 165% of normal during the period, generating moisture excesses of 9.74 inches and 7.07 inches, respectively. Large quantities of runoff flowed into the swollen Mississippi River, engendering the highest river stages in history at some locations. In sharp contrast, Greenville-Spartanburg, SC (bottom left) and Charlotte, NC (bottom right) reported under 45% of normal rainfall, resulting in shortfalls of 7.71 inches and 5.96 inches, respectively, for the 96-day period.

